Rocket City Weather

National Weather Service, Huntsville, AL

VOLUME I, ISSUE III SPRING 2011

INSIDE THIS ISSUE:

A Change in Leadership: Bidding Farewell to MIC Mike Coyne

For us here at the NWS in Huntsville, it doesn't seem like all that long ago that Mike Coyne became the Meteorologist-In-Charge (MIC) at the office, but when we look at the calendar, we realize it was 2005. Mike was the second MIC in Huntsville, and led this office through several major weather events (like the Super Tuesday Outbreak and the recent record breaking snowy winter), staff additions, and oversaw the office during a time of expanding partnerships with local emergency management, first responders, media and academia. But as all good things must come to an end, earlier this year Mike accepted a promotion to our regional headquarters (located in Ft Worth, Texas), where he is now serving as the Deputy Director of Performance and Resources. While we know Mike is excited about returning to his Texas roots and propelling the NWS into a new era of leadership and development, we here in Huntsville are going to miss him.

Thundersnow in the Valley?

Brian Carcione, Application Integration Meteorologist

Probably the most memorable event of this very active winter season was the heavy snow that fell on January 9th and 10th. Not only did the storm bring up to a foot of snow to parts of the Tennessee Valley, but it also brought thundersnow to the region as well. Thundersnow is a very real, but very rare event where lightning and thunder occur along with snowfall, and it was last observed in north Alabama during the "Superstorm" of March 1993. It requires a "special" form of instability to work since snow typically occurs without the instability or strong updrafts that accompany typical thunderstorms seen during the warmer months. Instead, thundersnow consists of very broad, very tilted updrafts that need conditional symmetric instability, or CSI, in addition to the right kind of ice crystals that allow for charged particle separation.

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Spring Severe Weather Season: Safety

Tips and Tricks

*Replace the batteries in your NOAA Weather Radio each time you change your clocks in the spring and fall.

*Make sure you have at least one way of receiving severe weather warnings (preferably two!)

*Know what to do if severe weather threatens: take the time NOW to practice tornado safety drills at home, school or work.

Watch vs Warning

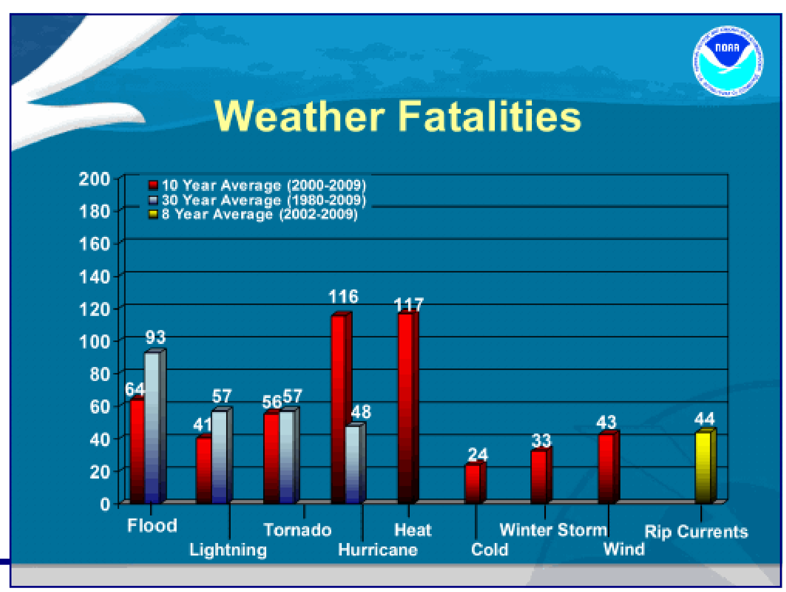
A ***Severe Thunderstorm Watch*** (or Tornado Watch) is issued by the Storm Prediction Center and the National Weather Service when ***conditions are favorable for severe weather*** (tornado) development within the watch area over the next several hours. Time to be weather aware!

A ***Severe Thunderstorm Warning*** (Tornado Warning) is issued by the National Weather Service when severe weather or tornadoes are ***imminent or occurring***. Take immediate action to protect

Did You Know?

According to a recent study, about 36% of Alabama's tornadoes occur at nighttime. The number is considerably higher in Tennessee at 46%. The percentage in Tennessee is actually the highest in the country! This high nighttime threat means it's crucial that everyone have access to weather and warning information at all hours of the day—something that will wake you in the middle of the night if severe weather threatens.

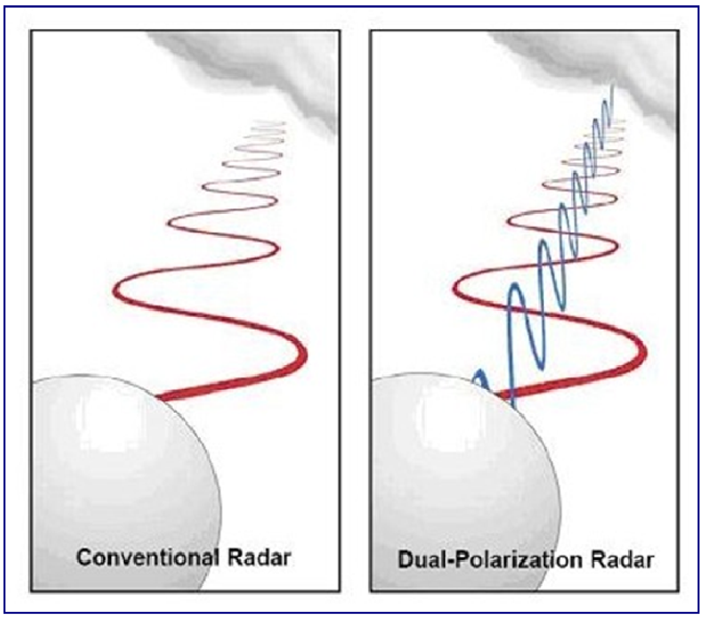
Flooding is the number one weather killer in the United States in the last 30 years. Flash flooding is a fast-moving event that can catch you quickly before you realize it. River flooding is a longer-duration event that can cause more widespread damage.



Dual Polarimetric Radar

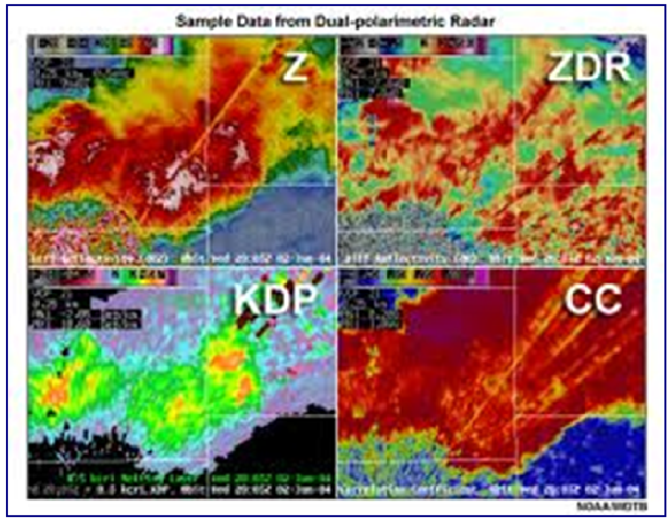
Dan Dixon, Forecaster

You may have recently heard meteorologists referring to something known as "dual-polarimetric" or "dual-pol" radar. This type of weather radar is the newest trend in the National Weather Service radar program, and offers unique capabilities that the current NEXRAD system does not have. Both the dual-polarimetric radar and the NEXRAD transmit high frequency radio waves to measure the properties of clouds and precipitation particles (rain, snow, hail, and ice pellets). When a radio wave is transmitted, there is a brief delay that



Conventional radar waves (left) versus waves from a Dual-Polarimetric Radar (right)

occurs while the radar's receiver listens for energy that is being reflected from the clouds and precipitation particles.
From this information, the radar can determine properties of clouds and precipitation, such as where these features are located with respect to the radar and how fast they are moving either toward or away from the radar, which is very important for the detection of rotation and potential tornadic development in thunderstorms. The primary difference between the legacy NEXRAD system and the upcoming dual-polarimetric radar is in which the radio waves are transmitted. The NEXRAD only transmits radio



Additional radar "variables" on display

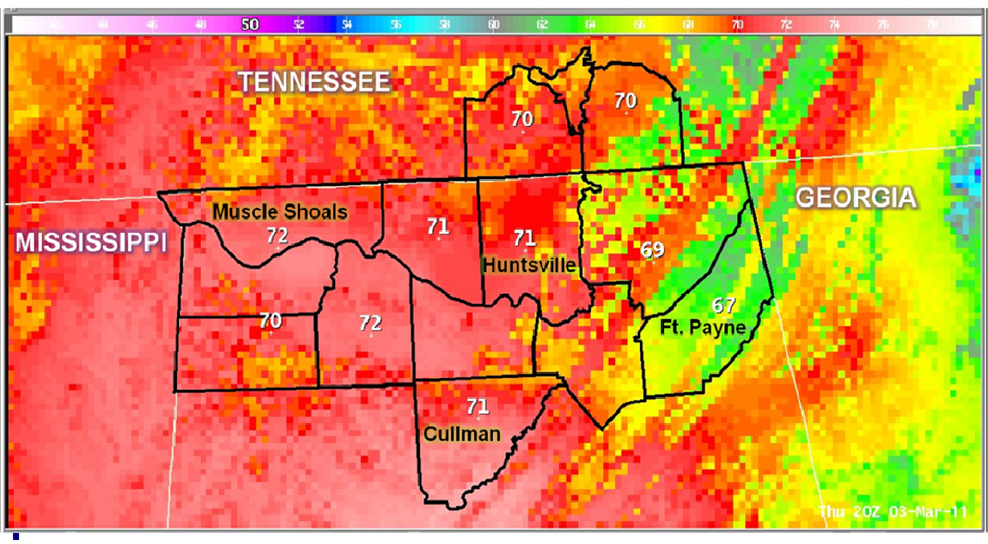
waves in the horizontal direction, which allows it to only measure horizontal properties of clouds and precipitation. The dual-polarimetric radar transmits radio waves in both the horizontal and vertical directions, which gives it the capability to diagnose the vertical properties of a cloud, and ultimately leads to additional information on rainfall rates and precipitation estimations.

Although there is no additional utility for analyzing rotation in thunderstorms from using dual-polarimetric radar, NWS meteorologists will be able to serve you better by making more accurate estimates of rainfall rates, snowfall rates, and hail size, identifying multiple precipitation types in winter storms, and predicting the amount of lightning activity that a thunderstorm will produce. Dual-polarimetric radar is currently scheduled to be implemented at the Hytop radar site in northeast Alabama in 2012.

Color-by-Number or Color-by-Forecast?

Christina Crowe, Forecaster

Everyone, at some point in their life, has probably filled in a color-by-number sheet in a children's coloring book or completed a paint-by-number kit. Filling in the greens, then blues, then yellows, a picture of a playful clown or beautiful landscape gradually comes into view. Meteorologists at the NWS in Huntsville do something quite similar every day to make our forecast. But instead of a sheet of paper with a design, we use a computer program with a map of the Tennessee Valley on a neat grid. Rather than crayons or paint, we use our computer mouse and tools in our program to paint our forecast on the map. In the end, this all gets put together so you can go to our website, click on your location on the map, and get a personalized forecast for your point on our grid.



A screenshot of our Graphical Forecast Editor

The Graphical Forecast Editor (also known as 'GFE') is one of the most important tools for National Weather Service meteorologists in making our forecast; because rather than typing up a text forecast for only a few major towns, we can provide more detailed forecasts for our entire area. For example, the image above shows an example of a forecast grid for high temperatures on a particular day. Just like in a color-by-number, each color corresponds to a temperature (the color bar at the top shows the range, for example red corresponds to a temperature around 70°F while pinks and purples are closer to 50°F). You can see that this forecaster has put in some details in northeast Alabama and southern Tennessee – the lighter green colors (low to mid 60s) show that places up on the Cumberland Plateau will not warm up as much as locations like Cullman or Muscle Shoals, which are colored in shades of orange and red (in the 70s).

Our computer models give us forecast grids that we can use as a starting point when making our forecast. We can change them around to get the forecast we think is right by doing things like smudging some of the colors, shrinking or stretching the range of temperatures on the grid, or just adjusting all the values up or down. But if we don't like what the computers come up with, we can simply start from scratch and color our own numbers in. For example (see image on page 5), we can draw lines on our map where we want certain temperatures to go (top) then the program will fill in all the points in between (bottom). The forecaster in this example might be showing a strong cold front coming into the Tennessee Valley from the northwest, dropping temperatures from the mid 50s into the low 30s!

Besides temperatures, we create the rest of your entire forecast in these grids. On a regular forecast shift, a meteorologist will 'paint' a separate grid for each of the next 7 days for all of these pieces of a forecast: temperature, dew point, relative humidity, wind speeds and gusts, cloud cover, weather type (for example – rain showers, snow, or fog), probability of

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Color-by-Number or Color-by-Forecast?

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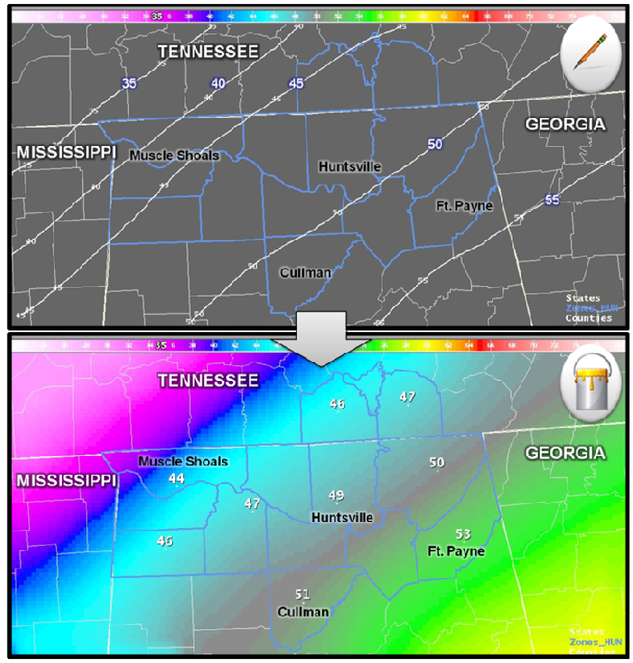
precipitation (for example – 80% chance of rain, or thunderstorms likely), and amount of rainfall/snow/ ice accumulation.

When you go to http://www.weather.gov/huntsville, click on the map, and get the forecast for where you live; the website goes to your spot on each of those grids that we created, puts all the pieces together, and gives you your forecast.

Visit http://www.weather.gov/forecasts/wfo/sectors/ hun.php to see the forecast grids for northern Alabama and southern middle Tennessee, along with the gridded forecasts from all the other National Weather Service forecast offices across the county.



Thundersnow in the Valley?

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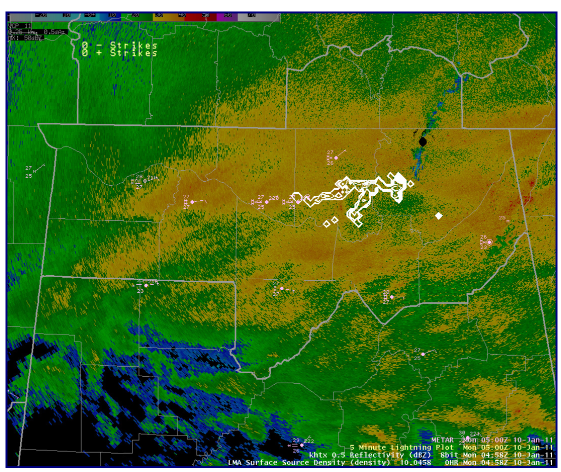
The rarity of thundersnow in the Tennessee Valley will certainly make the January 2011 event a topic of research and discussion within the local meteorological community for months and years to come. It was also unique because the lightning strikes occurred within the North Alabama Lightning Mapping Array, a network of 11 sensors in and around the Huntsville metro area that detects both cloud-to-ground lightning strikes and intra-cloud lightning. Meteorologists from the National Weather Service, NASA, the University of Alabama in Huntsville, as well as other research groups, are able to examine and study much more about the electrical structure of thunderstorms because of the North Alabama LMA. In fact, NWS Huntsville is able to view information from the North Alabama LMA in real time, and the data are often used to help make decisions for severe thunderstorm and tornado warnings.



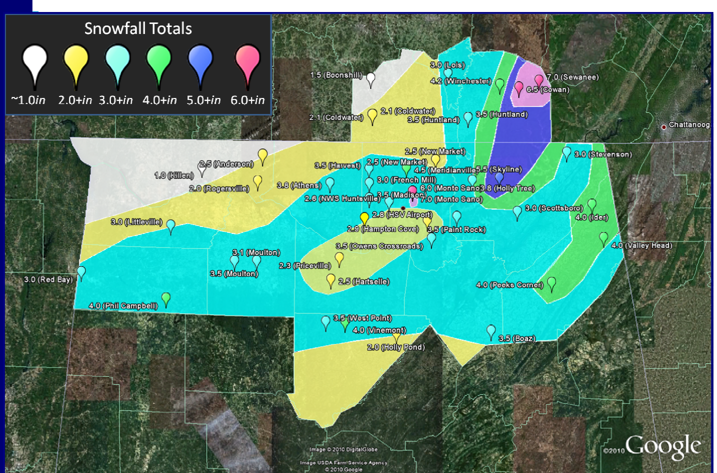
Radar in the background, with intra-cloud lightning in white contours.

Researchers from many different groups are already hard at work deciphering the total lightning information from the January thundersnow event. One thing immediately jumps out: many of the lightning strikes originated in Madison County, specifically in the vicinity of Monte Sano. Researchers believe that several of the lightning strikes were triggered by radio and television towers on the ridge top. More investigation of this very rare event is planned for the coming months.

The Long Cold Winter of 2010-2011

Kris White, Forecaster

The winter of 2010-2011 will probably be remembered as a cold and snowy one across the Tennessee Valley. While it was not as cold as last winter, and certainly was not the coldest on record (locally, that belongs to the winter of 1977-78), it was the snowiest in over 40 years for many locations. After a very wet end to November, in which daily and even an all-time daily precipitation record for the month was set at Huntsville, December and winter seasonal temperatures started out a little chilly. But, this was just the beginning of a large scale pattern change that would bring the Tennessee Valley repeated intrusions of cold, arctic air and several significant snowstorms.



This graphic shows storm total snow amounts from the Christmas Day Snowstorm.

The first snowstorm struck the area early on Christmas morning. The first flakes began to fall in the predawn hours, and by sunrise, much of the area was blanketed by a light snowfall. By the time the snow had come to an end late Christmas morning, snowfall totals were around two to three inches across most of the area. It was the largest Christmas snowfall on record for many locations, including Huntsville and Muscle Shoals. At the Shoals, it was actually the only measurable snowfall on record for December 25th. Incidentally, the 2 to 3 inches of snow that fell represented the normal snowfall for the entire winter season for most locations. But, much more was to follow in January.

December ended and January began deceptively mild, with afternoon temperatures rising into the 60s and 70s on New Year's Eve and New Year's Day. Heavy precipitation accompanied the unusually warm airmass. Another daily precipitation record was set at Huntsville on January 1st, as 3.48 inches of rain was recorded at the airport. However, this reprieve in the pattern was set to come to an end.

On the 8th of January another in a series of cold airmasses moved into the region. Temperatures gradually fell over the next few days, setting the stage for a major snow event as a low pressure system crossed the Gulf of Mexico on the 9th and 10th. Snow began falling during the evening hours of Sunday, January 9th, and became intense very quickly. Some areas, including the Huntsville metro, reported about

Tennessee Valley residents measured snow with anything available—from soda bottles to rulers.

one to two hours of thundersnow, a very rare occurrence here in the Tennessee Valley. *Editor's*

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The Long Cold Winter of 2010-2011

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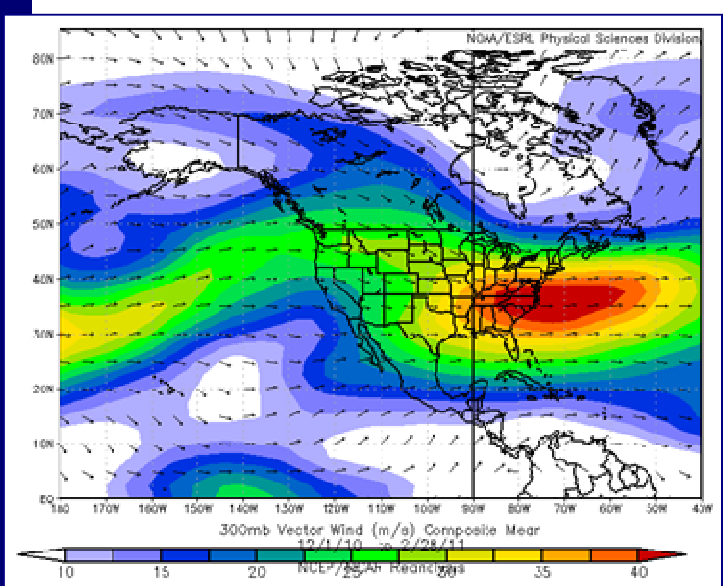
Note: Please see the article "Thundersnow" on page 1. Snowfall rates around two to four inches per hour were reported in some locations during the thundersnow event. By the time most of the snow had finally come to an end early on Monday morning, snowfall totals ranged from around 3 to 4 inches along the southern border of the Huntsville Forecast Area, to as much as 12 to 14 inches in northern portions of the area, particularly in Lauderdale County. It was the heaviest widespread snowfall event at many locations since the '93 March snowstorm or the snowstorm of December 1988. At the Shoals, it was the single heaviest snowfall since the major New Year's Eve snowstorm of 1963-64, when over 19 inches was recorded (measured in Florence). After the official 8.9 inches of snowfall at Huntsville, a reinforcement of cold air only added insult to injury. Temperatures averaged around 10 to 20 degrees below normal over the following week. Due to the cold air and mostly cloudy conditions, snow depth was reported at Huntsville for 8 consecutive days following the heavy snow event. This set a new record for snow depth duration at Huntsville.



Mean 300 mb wind for December—February

Other snowfalls were reported later in January and again in early February, but none matched the heavy snow event of the 9th and 10th of January. Around the middle of February, a large scale pattern change brought warm conditions to the Tennessee Valley through the remainder of the winter season. Nevertheless, winter season snowfall totals were already well above normal. The 14.2 inches at Huntsville was the highest recorded here since the winter of 1963-1964.

So, in this season of La Niña, when winter temperatures are typically above normal in the Tennessee Valley, what brought the cold conditions and repeated snows to the region? Well, much remains to be resolved regarding the reasons for the abrupt change in the large scale pattern this past winter, and it should be stated that not all La Niña winters are relatively warm here in the Tennessee Valley, as local research shows. However, it was the stark contrast to expected conditions, especially in the southeastern U.S. that was somewhat surprising. As large scale reanalysis shows, the mean upper jet (300mb) configuration for the winter season showed troughing along the eastern seaboard and into the western Atlantic (left). With northwesterly flow aloft dominant through the period, this allowed for the repeated intrusions of arctic and Canadian air into the Tennessee Valley. The map on page 8 shows 500mb height anomalies, which were strongly positive across much of Canada, especially eastern Canada, and were strongly negative across much of the eastern United States. This is descriptive of a negative North Atlantic Oscillation (NAO) pattern. The graph below shows the predominance of the negative phase of the NAO over the last several years, but particularly since late 2009. That winter (2009-2010) saw the most negative

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The Long Cold Winter of 2010-2011

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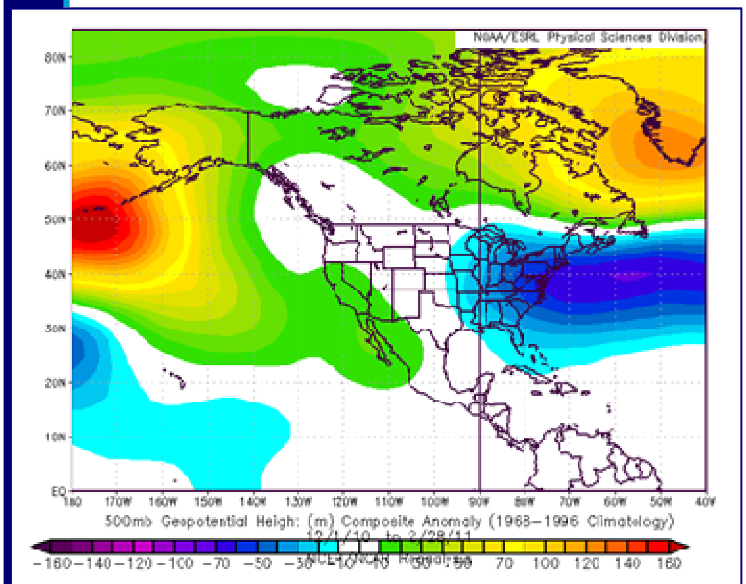
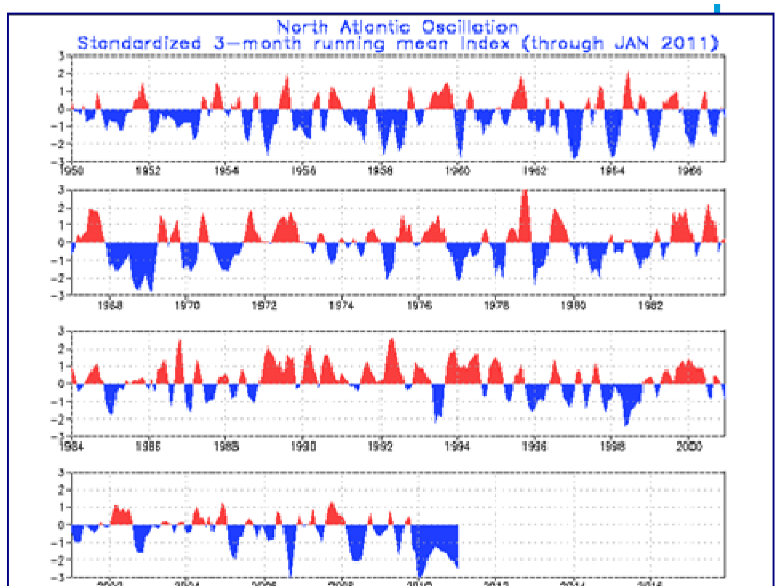
anomalies on record since the NAO was tracked. Essentially, this pattern reflects the large scale North-South dipole of height anomalies over the North Atlantic, including eastern North America, western Europe and southern Greenland. When the NAO is in a negative phase, such as the last couple of winters, height anomalies are negative in the eastern U.S. and the central North Atlantic, while positive anomalies are prevalent across eastern Canada and Greenland. This is indicative of cold air displacement or a predominance of northerly flow into the eastern United States, while southerly flow and milder air is circulated correspondingly into eastern Canada and Greenland. The persistent troughing in the eastern U.S. and ridging over eastern Canada and the adjacent arctic is the reason for the colder than normal winters here in the Tennessee Valley and adjacent regions especially to the east while winters have been much above normal in eastern Canada and Greenland these past couple of years.



500 mb height anomalies for December—February

So, why was this pattern not better forecast by seasonal prognostications? Unfortunately, seasonal forecasters still don't have high predictive skill in forecasting the pattern that results in either the negative or positive phase of the NAO. The shifts between negative and positive phase are often on timescales of weeks (the NAO graph displayed within is a 3-month running mean, and is smoothed), and the tendency for this pattern to remain locked within a particular phase is likewise not well understood or forecast. These features are also dependent on the location of long wave troughs and ridges for which forecast reliability is only about a couple of weeks at best. Future research may begin to unlock the secrets behind these seasonal and sub-seasonal phenomena, and allow for the variations that are observed within La Niña and El Niño episodes.



NAO standardized 3-month running mean index

Fire Weather Forecasting

Stephen Latimer, Forecaster

Some might ask why there actually is a fire weather program in Huntsville as climatologically moist as this area is. Well, there are a few reasons why most (if not all) National Weather Service offices have a fire weather program. One reason is that fire weather forecasts are needed by the United States Forest Service (USFS), the Alabama Forestry Commission (AFC), and the National Park Service (NPS) along with anyone else that needs fire weather information when fighting fires. Another reason is that when there are prescribed fires, wildfires, or even hazardous material (HAZMAT) spills, we provide decision support spot (small area) forecasts to help emergency managers and clean-up crews do their job. If the fires, spills, etc. become large enough, a National Weather Service Incident Meteorologist (IMET) will be sent to the site of the incident.

Our fire weather forecasts become quite important when it becomes dry and windy over the area, especially during the spring and fall. When these conditions are expected, fire can spread rapidly if started, especially if area vegetation is dry as well. Thus, when we expect something like this to happen, we will make sure that each of our fire weather partners know that dangerous fire weather conditions are likely. Often when this happens we will issue a “Red Flag Warning” to call attention to everyone in the fire weather community to be even more vigilant with any burning that is occurring.

However, when our forestry partners are making preparations for prescribed burns to clear underbrush and dead fuels, or if a wildfire starts, they need us to provide specific weather information for the area affected. This can also happen if emergency response personnel need weather information for HAZMAT spills. When any of these events occur, they will typically request what is called a spot forecast (a forecast for a specific latitude/longitude). We then take the request and generate a forecast for wind speed and direction, relative humidity, temperature, any weather (rain, thunderstorms), and amount of precipitation expected (if any) among other things. They will then use that information to make decisions on where to place critical personnel monitoring prescribed burns, or fighting the wildfire/ HAZMAT spill. If rapid weather changes are expected, we will include this on the spot weather forecast which can mean saving lives and property. If a wildfire becomes quite large, an IMET will be dispatched from any one of the National Weather Service offices nationwide. The IMET will then provide the firefighting personnel with weather briefings and monitor conditions right where the fire is occurring.

Therefore, whenever you hear of a HAZMAT spill, visit a national forest, state, or national park, and you notice areas where the forest is burned, chances are the National Weather Service was involved with the emergency response, helping firefighting personnel fight the fire.

Smiling Faces in Huntsville!

Promotions all around the office

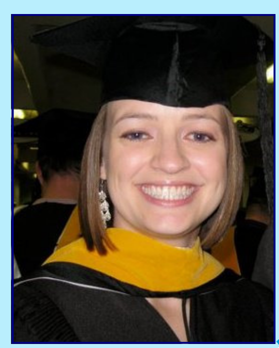
One of the greatest things about the National Weather Service is that we have opportunities for employment and promotions across the country. Since our fall newsletter, we have had several staff changes. Two of our senior forecasters, Krissy Scotten and Jason Elliott accepted promotions. Krissy took the position of Warning Coordination Meteorologist with the NWS Office in Amarillo, Texas; her job focuses on internal and external public relations within north Texas and the Oklahoma panhandle. Jason moved to Washington, D.C., to become the Senior Service Hydrologist for the NWS Office in Sterling, Virginia; he now oversees the NWS Hydrology programs across northern Virginia and Southern Maryland.

While we miss both Krissy and Jason, we are excited to welcome Kris White and Dan Dixon as their replacements!

Kris has served the Tennessee Valley since the spring of 2007 as a forecaster, and is thrilled to move into his new position. A native of Tennessee, Kris is a graduate of the University of Oklahoma, and was previously a forecaster at the Reagan Missile Test Site at Kwajalein in the Republic of the Marshall Islands from 2003 to 2006. He joined the NWS family, first as a forecaster in Duluth, Minnesota in March 2006 before eventually moving to Huntsville. His niche in the office is the climate program, a subject which is near and dear to his heart, and he is also our office webmaster.

Dan is a native of Kingsport, Tennessee, but attended The University of Oklahoma, where he obtained B.S. and M.S. degrees in Meteorology. He began his career with the National Weather Service as a SCEP Student at the WFO in Morristown, TN, and, since graduating from college, has been employed as a forecaster at the NWS in Brownsville TX, Dallas-Fort Worth TX, Miami FL, and Huntsville AL. Dan has also served in various capacities for local AMS/NWA chapters in Dallas-Fort Worth TX and Miami FL. Although he enjoys all aspects of forecasting, his favorite part of the job is being a radar operator or warning meteorologist during a convective event. Dan also enjoys a variety of outreach activities including giving presentations at schools and Skywarn Spotter training sessions.

Since Kris was promoted to senior forecaster, that means we had a forecaster position to fill. We are thrilled to announce that Huntsville native and meteorologist Chelly Amin accepted the position earlier this year.



Chelly has served the NWS Office in Huntsville since the summer of 2006 when she was an undergraduate student at Mississippi State. She accepted a Meteorologist Intern position within the office in the summer of 2007 and recently earned her graduate degree from Mississippi State in August 2010. Chelly is the Hydrology Program Manager and is very involved with the outreach and education programs in the office. We are so excited that Chelly accepted the Forecaster position earlier this year and we are looking forward to the year ahead with our new staff members!

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sr-hun.webmaster@noaa.gov

Spotter Email Address:
sr-hun.spotter@noaa.gov

Reporting Weather

There are several ways to report hazardous weather conditions such as hail, wind damage, funnel clouds, tornadoes, exceptionally heavy rainfall or flash flooding:

1. **Call the office at 256-890-8503**
2. **Submit your report online**
3. **After the event, email pictures to:**
   SR-HUN.Spotter@noaa.gov

Timely reports can save lives!

Hytop Radar (HTX) is currently scheduled for its dual-pol upgrade in 2012.

Rocket City Weather
Volume I, Issue III

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